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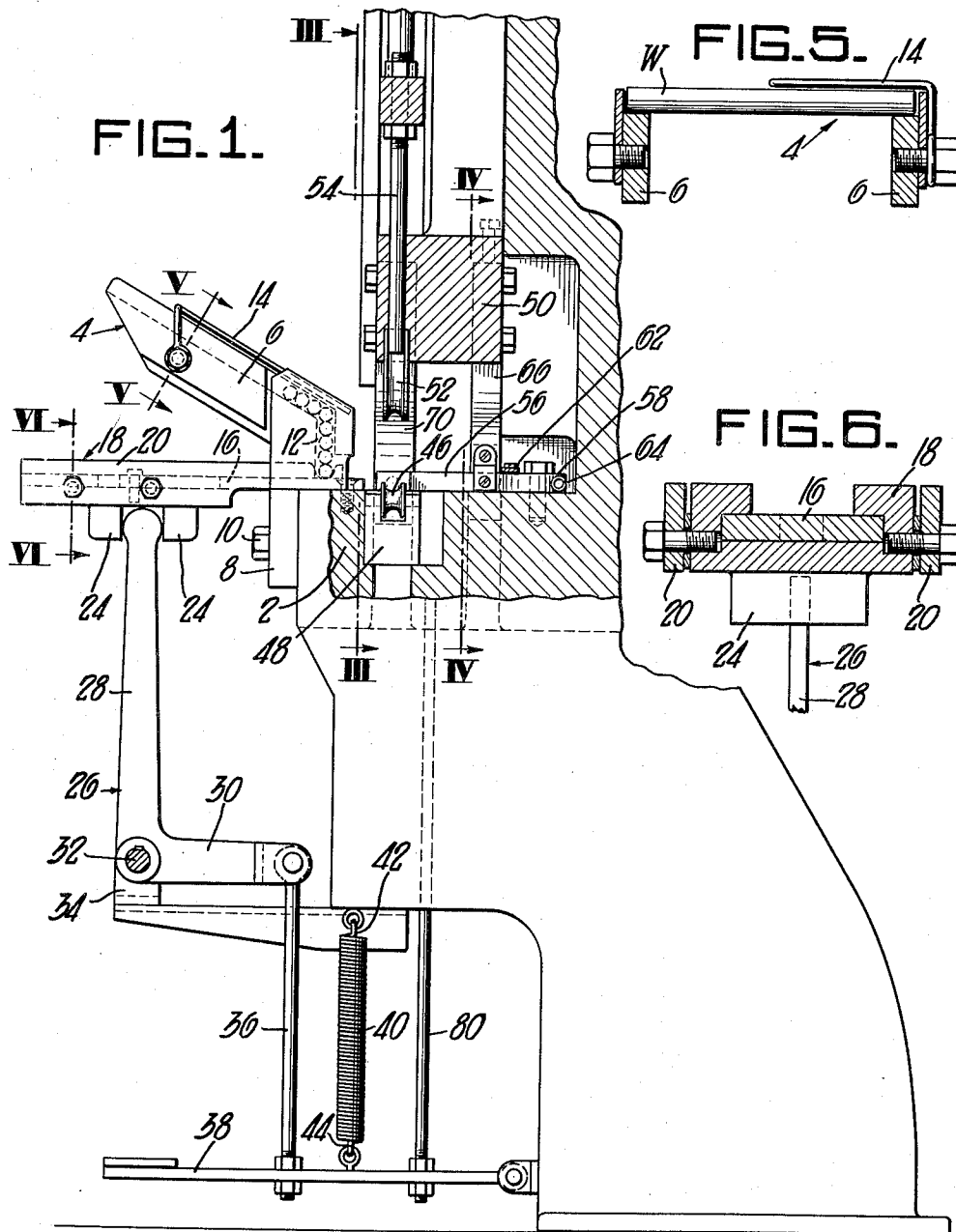
H. E. MAGNUSON ET AL

2,647,552

PUNCH PRESS

Filed Jan. 25, 1951

3 Sheets-Sheet 1



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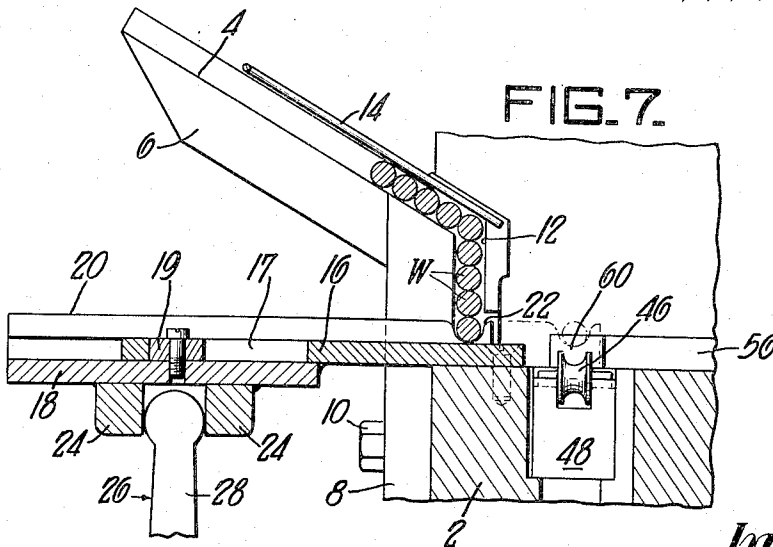
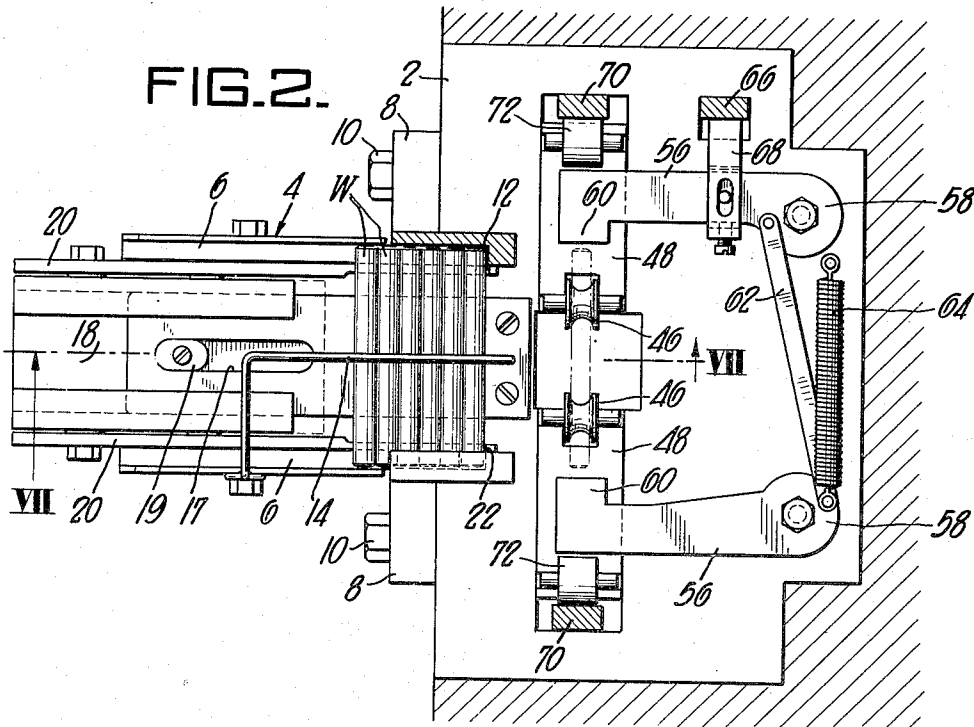
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PUNCH PRESS

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3 Sheets-Sheet 3

FIG. 3.

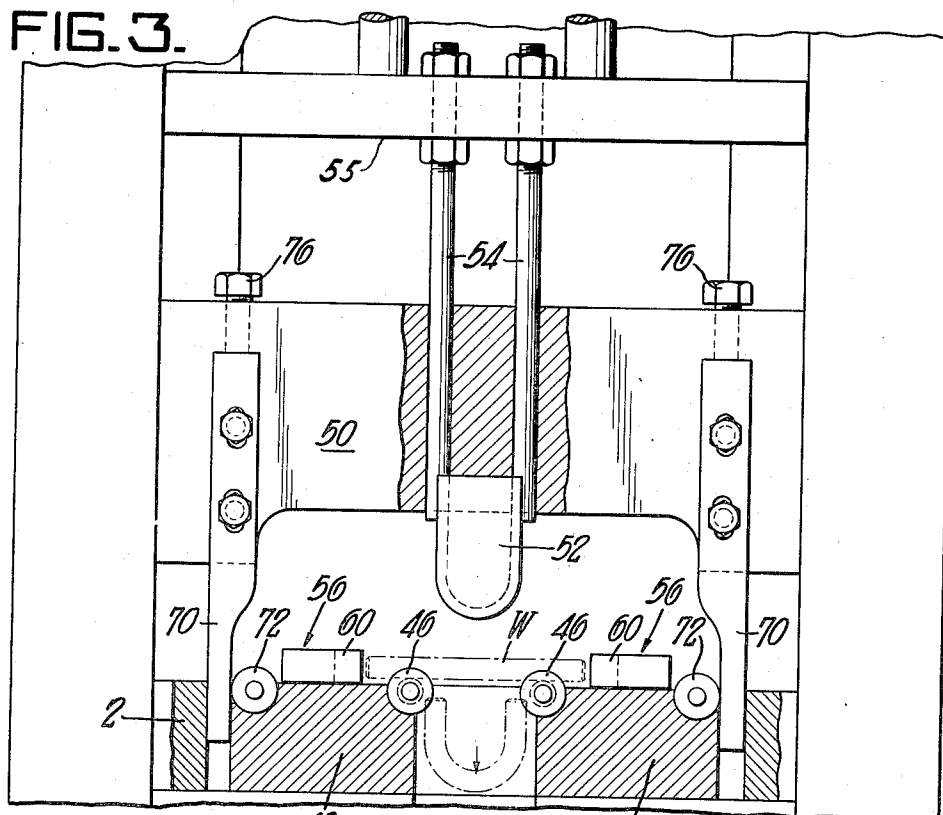
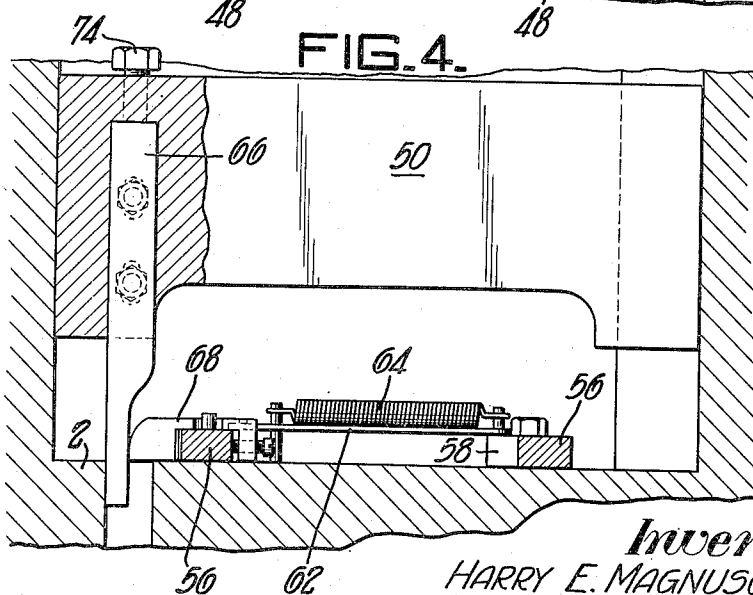


FIG. 4.



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UNITED STATES PATENT OFFICE

2,647,552

PUNCH PRESS

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15 Claims. (Cl. 153—48)

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The present invention relates to punch presses and more particularly to a punch press for forming U-bolts from straight rods. In the making of such bolts frequent accidents occur unless quite extensive safety precautions are taken and safety guards provided on the machines. A punch press is generally a fast action machine which, in many cases, is hand fed. In attempting to hand feed such machines and at the same time utilize the speed the machine is capable of without safety guards, fingers and hands may be amputated.

It is accordingly an object of this invention to provide a punch press which may be operated at the full capacity of its speed in a safe manner.

It is a further object of this invention to provide a punch press having a semi-automatic feed mechanism whereby the operation of the punch press and the feeding thereof is carried on simultaneously in a safe and speedy manner.

These and other objects will become more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is an elevation, partly in section, showing the punch press embodying our invention;

Figure 2 is a plan view taken above the punch press table;

Figure 3 is a view taken on the line III—III of Figure 1;

Figure 4 is a view taken on the line IV—IV of Figure 1;

Figure 5 is a sectional view taken on the line V—V of Figure 1;

Figure 6 is a sectional view taken on the line VI—VI of Figure 1; and

Figure 7 is a sectional view taken on the line VII—VII of Figure 2.

Referring more particularly to the drawings, reference numeral 2 indicates the table of a punch press for forming U-bolts from straight rods W. A magazine 4 having two channelled sides 6 is fastened to the table 2 by means of brackets 8 and cap screws 10. The magazine 4 is inclined toward the table 2 and is adapted to support a plurality of straight rods W. The lower end of the magazine is provided with a vertical discharge chute 12. A retaining spring 14 is attached to one side 6 of the magazine and extends therefrom over the workpieces W in the magazine for the purpose of retaining them therein in proper order. An elongated track plate 16 is disposed horizontally beneath the magazine with its forward end bolted to the table 2. A C-shaped carriage 18 is slidably mounted on the edges of the track plate 16 for longitudinal movement thereon. The open part of the C-shaped carriage faces upwardly of the track plate 16.

The track plate 16 is provided with a longitudinal slot 17 through which extends a stop member 19 which is carried by and projects upwardly from the bottom of the carriage 18. Thus the horizontal movement of the carriage 18 is limited

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by the ends of the slot 17. The forward end of the carriage 18 has bolted thereon a pair of spaced projecting arms 20 which extend toward the punch press. Each of the arms 20 is provided with a groove 22 adapted to receive and carry a workpiece W from the discharge chute 12. The underside of the carriage 18 is provided with two spaced downwardly extending lugs 24. A bell crank lever 26 having a vertical leg 28 and a horizontal leg 30 is disposed beneath the plate 16 with the top end of the leg 28 fitted loosely between the lugs 24. The bell crank lever 26 is keyed to a shaft 32 which is rotatably supported in two spaced bearings 34. The free end of horizontal leg 30 is pivotally connected to a downwardly extending connecting rod 36 which is connected to a foot pedal 38. A spring 40 which is anchored at one end 42 to the punch press and at its other end 44 to the foot pedal acts to return the foot pedal to normal position after it has been depressed. When the foot pedal is depressed, the motion is transmitted by means of the connecting rod 36 and bell crank lever 26 to the carriage 18 to thereby cause horizontal motion thereof toward the punch press table 2.

Two aligned grooved rolls 46 are mounted one on each of two spaced apart blocks 48 which are slidable toward and away from each other on the table 2 as will be more fully explained hereinafter. The punch press is provided with the usual press ram head 50. A punch 52 is attached to and extends downwardly from the press ram 50 to a point normally above and in between the rolls 46. Two stripping rods 54 are fastened to and extend downwardly from a bracket 55 through the ram head 50 adjacent the punch 52. Pivotally mounted at the rear of the table 2 is a pair of spaced fingers 56. The pivoted ends 58 of the fingers 56 are shaped in the form of a cam while the free ends 60 are formed in a shape of an L and are disposed astride the rolls 46 which are adapted to receive a rod W. A bar 62 which is attached at one end to one of the fingers 56 at a point immediately adjacent the cam end 58, extends therefrom to a point on the outer portion of the cam end 58 of the other finger. Thus the movement of the fingers is synchronized so that the movement of one will cause movement of the other. A tension spring 64 which has one end anchored to the table 2 and its other end connected to one of the cam ends 58 returns the fingers to their normal position when pressure is removed therefrom. The fingers 56 function to center the workpiece W lying on the rolls 46 in the path of punch 52. This is accomplished by means of an elongated cam 66 which is attached to the press ram 50 and depends therefrom in a vertical plane adjacent one of the fingers 56 and a slotted transverse space bar 68 which is adjustably fastened to the finger 56 adjacent the cam 66 against which it bears.

Movement of the slidable blocks 48 toward each

other is brought about by means of a pair of elongated cams 70 which are attached to the press ram 50 and depend therefrom in vertical planes adjacent the slide blocks 48. A roll or cam follower 72 is mounted on each of the blocks 48. Bolt 74 is provided for adjusting the position of elongated cam 66 and bolts 76 are provided for adjusting the position of cams 70.

A connecting rod 80 is attached at one end to the foot pedal 38 and extends upwardly therefrom to the actuating mechanism (not shown) for operating the press ram 50. Thus the punch 52 may be moved as soon as possible after a rod W is in position for bending.

In operation, the machine operator places a plurality of straight rods W in the magazine 4. The spring retainer 14 holds the rods in single row position in the magazine and allows them to move forward and drop into the discharge chute 12. Initially the carriage 18 is positioned so that the arms 20 extend forward to position the grooves 22 under the discharge chute 12. After a rod W is dropped into the groove, the foot pedal 38 is depressed, actuating the bell crank lever 26, thus moving the carriage 18 forward and causing the arms 20 to enter the punch press astride the rolls 46. The slots 17 and stop member 19 limit the movement of the carriage 18 so that the arms support the rod W above the rolls 46 at the limit of their forward movement. Thus the rod W is positioned under the punch 52 and over the rolls 46. At the same time, the foot pedal 38 through the connecting rod 80 actuates the punch press to start the press ram downwardly. The fingers 56, actuated by the cam 66, centralize the rod W under the punch 52. The bar 62 and the spring 64 function to return the centering fingers 56 to original position after the punching operation. During the downward stroke of the punch 52 the rod W is pushed through the rolls 46 forming a U-shaped bolt. As a final action the cams 70 exert pressure on the rolls 72 to move the blocks 48 together to give the U-shaped bolt its proper formation by overcoming any spring back due to tension. If the U-bolt sticks to the punch the stripper rods 54 remove the finished U-bolt from the punch 52 when the ram 50 moves upwardly to the position shown in Figure 3. The tension spring 40 returns the foot pedal 38 to its original position after the operation is completed and the carrying arms 20 remain in position astride the rolls 46 until pressure is removed from the foot pedal 38 and the tension spring 40 causes the foot pedal 38 to move back to its original position and thereby move the carriage 18 back to its initial position.

While we have shown and described one specific embodiment of our invention, it will be understood that this embodiment is merely for the purpose of illustration and description and that various other forms may be devised within the scope of our invention, as defined in the appended claims.

We claim:

1. A punch press for forming U-shaped articles from straight rods comprising a pair of spaced grooved guide rolls, a reciprocating press ram positioned above said spaced rolls, a punch attached to said press ram and normally positioned above and between said spaced rolls, means for supporting a straight rod above said spaced rolls, means for centering a straight rod supported above said spaced rolls in the path of said punch, said punch press ram being mov-

able to drive said punch downwardly to bend said straight rod into a U-shape between said spaced rolls, an inclined magazine disposed adjacent said punch press with its lower end adjacent said spaced rolls, said magazine being adapted to contain a plurality of straight rods, a vertical discharge chute in the lower end of said magazine, an elongated pusher rack slidably disposed horizontally beneath said magazine, said rod supporting means including a pair of spaced arms projecting from the forward end of said pusher rack, said projecting arms having grooves in the ends thereof for receiving a rod from said discharge chute, and means for moving said rack toward said punch press to position said spaced arms astride said pair of spaced rolls and thereby support said rod in the path of said punch.

2. A punch press for forming U-shaped articles from straight rods comprising a pair of spaced grooved guide rolls, a reciprocating press ram positioned above said spaced rolls, a punch attached to said press ram and normally positioned above and between said spaced rolls, means for supporting a straight rod above said spaced rolls, means for centering a straight rod supported above said spaced rolls in the path of said punch, said punch press ram being movable to drive said punch downwardly to bend said straight rod into a U-shape between said spaced rolls, an inclined magazine disposed adjacent said punch press with its lower end adjacent said spaced rolls, said magazine being adapted to contain a plurality of straight rods, spring means attached to said magazine for retaining said straight rods therein, a vertical discharge chute in the lower end of said magazine, an elongated track plate disposed horizontally below said magazine with the forward end thereof attached to said punch press adjacent said spaced rolls, a C-shaped carriage slidably mounted around the side edges of said track plate for movement toward and away from said punch press, said rod supporting means including a pair of spaced arms attached to and extending away from said carriage in the direction of said punch press, a pair of grooves in the forward end of said arms for receiving a straight rod from said discharge chute, and means for moving said carriage toward said punch press to position said spaced arms astride said pair of spaced rolls and thereby support said rod in the path of said punch.

3. A punch press as defined in claim 2 characterized by said carriage moving means including a pair of spaced lugs depending from the underside of said carriage, a bell crank lever having a vertical and horizontal leg disposed below said carriage with the free end of its vertical leg positioned loosely between said lugs, a foot pedal disposed below said bell crank, a connecting rod attached to and extending upwardly from said foot pedal to a pivotal connection with the horizontal leg of the bell crank, and a spring anchored at one end and having its other end attached to said foot pedal for returning the same to normal position after being depressed.

4. A punch press as defined in claim 3 in which the foot pedal has a connection for actuating said ram to move said punch downwardly when the foot pedal is depressed.

5. A punch press as defined in claim 3 characterized by said elongated track having an axially aligned slot therein of predetermined distance along the path of said carriage, a stop member projecting upwardly from the bottom

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of said carriage through said slot for limiting the movement of said carriage toward and away from said punch press.

6. A punch press for forming U-shaped articles from straight rods comprising a pair of spaced grooved guide rolls, a reciprocating press ram positioned above said spaced rolls, a punch attached to said press ram and normally positioned above and between said spaced rolls, means for supporting a straight rod above said spaced rolls, means for centering said straight rod supported above said spaced supports in the path of said punch, said centering means including a pair of fingers pivotally mounted at one end and disposed with their free ends astride said spaced rolls, the pivoted end of each finger being shaped in the form of a cam, a bar attached to and extending between said cam ends for synchronizing the movement of said fingers, spring means attached to one of said fingers for urging said fingers into normal position, an elongated cam attached to said press ram and depending therefrom in a vertical plane adjacent one of said fingers whereby the downward movement of said press ram causes said elongated cam to move said fingers toward each other, adjustable means for limiting the movement of said fingers, said punch press ram being movable to drive said punch downwardly to bend said straight rod into a U-shape between said spaced rolls, an inclined magazine disposed adjacent said punch press with its lower end adjacent said spaced rolls, said magazine being adapted to contain a plurality of straight rods, a vertical discharge chute in the lower end of said magazine, an elongated pusher rack slidably disposed horizontally beneath said magazine, said rod supporting means including a pair of spaced arms projecting from the forward end of said pusher rack, said projecting arms having grooves in the ends thereof for receiving a rod from said discharge chute, and means for moving said rack toward said punch press to position said spaced arms astride said pair of spaced rolls and thereby support said rod in the path of said punch.

7. A punch press for forming U-shaped articles from straight rods comprising a pair of spaced grooved guide rolls, a reciprocating press ram positioned above said spaced rolls, a punch attached to said press ram and normally positioned above and between said spaced rolls, means for supporting a straight rod above said spaced rolls, means for centering said straight rod supported above said spaced rolls in the path of said punch, said centering means including a pair of fingers pivotally mounted at one end and disposed with their free ends astride said spaced rolls, the pivoted end of each finger being shaped in the form of a cam, a bar attached to and extending between said cam ends for synchronizing the movement of said fingers, spring means attached to one of said fingers for urging said fingers into normal position, an elongated cam attached to said press ram and depending therefrom in a vertical plane adjacent one of said fingers whereby the downward movement of said press ram causes said elongated cam to move said fingers toward each other, and adjustable means for limiting the movement of said fingers, said punch press ram being movable to drive said punch downwardly to bend said straight rod into a U-shape between said spaced rolls, an inclined magazine disposed adjacent said punch press with its lower end adjacent said spaced rolls, said magazine being adapted to contain a

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plurality of straight rods, spring means attached to said magazine for retaining said straight rods therein, a vertical discharge chute in the lower end of said magazine, an elongated track plate disposed horizontally below said magazine with the forward end thereof attached to said punch press adjacent said spaced rolls, a C-shaped carriage slidably mounted around the side edges of said track plate for movement toward and away from said punch press, said rod supporting means including a pair of spaced arms attached to and extending away from said carriage in the direction of said punch press, a pair of grooves in the forward end of said arms for receiving a straight rod from said discharge chute, and means for moving said carriage toward said punch press to position said spaced arms astride said pair of spaced rolls and thereby support said rod in the path of said punch.

8. A punch press as defined in claim 7 characterized by said carriage moving means including a pair of spaced lugs depending from the underside of said carriage, a bell crank lever having a vertical and horizontal leg disposed below said carriage with the free end of its vertical leg positioned loosely between said lugs, a foot pedal disposed below said bell crank, a connecting rod attached to and extending upwardly from said foot pedal to a pivotal connection with the horizontal leg of the bell crank, and a spring anchored at one end and attached to said foot pedal by its other end for returning the same to normal position after being depressed.

9. A punch press as defined in claim 8 in which the foot pedal has a connection for actuating said ram to move said punch downwardly when the foot pedal is depressed.

10. A punch press as defined in claim 8 characterized by said elongated track having an axially aligned slot therein of predetermined distance along the path of said carriage, a stop member projecting upwardly from the bottom of said carriage through said slot for limiting the movement of said carriage toward and away from said punch press.

11. A punch press for forming U-shaped articles from straight rods comprising a pair of spaced grooved guide rolls, a reciprocating press ram positioned above said spaced rolls, a punch attached to said press ram and normally positioned above and between said spaced rolls, means for supporting a straight rod above said spaced rolls, means for centering said straight rod supported above said spaced rolls in the path of said punch, said centering means including a pair of fingers pivotally mounted at one end and disposed with their free ends astride said spaced rolls, the pivoted end of each finger being shaped in the form of a cam, a bar attached to and extending between said cam ends for synchronizing the movement of said fingers, spring means attached to one of said fingers for urging said fingers into normal position, an elongated cam attached to said press ram and depending therefrom in a vertical plane adjacent one of said fingers whereby the downward movement of said press ram causes said elongated cam to move said fingers toward each other, and adjustable means for limiting the movement of said fingers, said punch press ram being movable to drive said punch downwardly to bend said straight rod into a U-shape between said spaced rolls.

12. A punch press for forming U-shaped articles from straight rods comprising a pair of

spaced grooved guide rolls, a reciprocating press ram positioned above said spaced rolls, a punch attached to said press ram and normally positioned above and between said spaced rolls, means for supporting a straight rod above said spaced rolls, means for centering said straight rod supported above said spaced rolls in the path of said punch, said centering means including a pair of pivoted levers arranged one on the outside of each of said rolls, one end of each of said levers extending to a point adjacent one of said rolls, a bar attached to and extending between said levers adjacent the pivots thereof, one on one side of one pivot and the other on the other side of the other pivot, resilient means attached to one of said levers for urging said levers into normal position, an elongated cam attached to said press ram and depending therefrom in a vertical plane adjacent one of said levers whereby the downward movement of said press ram causes said elongated cam to move said levers toward each other, said punch press ram being movable to drive said punch downwardly to bend said straight rod into a U-shape between said spaced rolls.

13. A punch press for forming U-shaped articles from straight rods comprising a pair of spaced grooved guide rolls, a pair of spaced apart blocks slidable toward and away from each other, one of said rolls being mounted on each of said blocks, a reciprocating press ram positioned above said spaced rolls, a punch attached to said press ram and normally positioned above and between said spaced rolls, a pair of cams mounted on said ram one adjacent the outer end of each of said blocks, means for supporting a straight rod above said spaced rolls, means for centering said straight rod supported above said spaced rolls in the path of said punch, said centering means including a pair of pivoted levers arranged one on the outside of each of said rolls, one end of each of said levers extending to a point adjacent one of said rolls, a bar attached to and extending between said levers adjacent the pivots thereof, one on one side of one pivot and the other on the other side of the other pivot, resilient means attached to one of said levers for urging said levers into normal position, an elongated cam attached to said press ram and depending therefrom in a vertical plane adjacent one of said levers whereby the downward movement of said press ram causes said elongated cam to move said levers toward each other, said punch press ram being movable to drive said punch downwardly to bend said straight rod into a U-shape between said spaced rolls, said pair of cams forcing said blocks inwardly at the end of ram travel to bend the legs of said U-shaped article toward each other.

14. A punch press for forming U-shaped articles from straight rods comprising a pair of spaced grooved guide rolls, a pair of spaced apart blocks slidable toward and away from each other, one of said rolls being mounted on each of said blocks, a reciprocating press ram positioned above said spaced rolls, a punch attached to said press ram and normally positioned above and between said spaced rolls, a pair of cams mounted on said ram one adjacent the outer end of each of said blocks, means for supporting a straight rod above said spaced rolls, said punch press ram being movable to drive said punch downwardly to bend said straight rod into a U-shape between said spaced rolls, said pair of cams forcing said blocks inwardly at the end of ram travel to bend the legs of said U-shaped article toward each other, an

inclined magazine disposed adjacent said punch press with its lower end adjacent said spaced rolls, said magazine being adapted to contain a plurality of straight rods, a vertical discharge chute in the lower end of said magazine, an elongated pusher rack slidably disposed horizontally beneath said magazine, said rod supporting means including a pair of spaced arms projecting from the forward end of said pusher rack, said projecting arms having grooves in the ends thereof for receiving a rod from said discharge chute, and means for moving said rack toward said punch press to position said spaced arms astride said pair of spaced rolls and thereby support said rod in the path of said punch.

15. A punch press for forming U-shaped articles from straight rods comprising a pair of spaced grooved guide rolls, a pair of spaced apart blocks slidable toward and away from each other, one of said rolls being mounted on each of said blocks, a reciprocating press ram positioned above said spaced rolls, a punch attached to said press ram and normally positioned above and between said spaced rolls, a pair of cams mounted on said ram one adjacent the outer end of each of said blocks, means for supporting a straight rod above said spaced rolls, means for centering said straight rod supported above said spaced rolls in the path of said punch, said centering means including a pair of pivoted levers arranged one on the outside of each of said rolls, one end of each of said levers extending to a point adjacent one of said rolls, a bar attached to and extending between said levers adjacent the pivots thereof, one on one side of one pivot and the other on the other side of the other pivot, resilient means attached to one of said levers for urging said levers into normal position, an elongated cam attached to said press ram and depending therefrom in a vertical plane adjacent one of said levers whereby the downward movement of said press ram causes said elongated cam to move said levers toward each other, said punch press ram being movable to drive said punch downwardly to bend said straight rod into a U-shape between said spaced rolls, said pair of cams forcing said blocks inwardly at the end of ram travel to bend the legs of said U-shaped article toward each other, an inclined magazine disposed adjacent said punch press with its lower end adjacent said spaced rolls, said magazine being adapted to contain a plurality of straight rods, a vertical discharge chute in the lower end of said magazine, an elongated pusher rack slidably disposed horizontally beneath said magazine, said rod supporting means including a pair of spaced arms projecting from the forward end of said pusher rack, said projecting arms having grooves in the ends thereof for receiving a rod from said discharge chute, and means for moving said rack toward said punch press to position said spaced arms astride said pair of spaced rolls and thereby support said rod in the path of said punch.

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